

The Role of HFO Technology in Achieving Climate Goals while Meeting Industry Needs

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Topics



Who is Chemours?

What is an HFO?

How does HFO technology help achieve climate goals?

How do we know HFO technology will work?

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The Chemours Company

New company
created from
DuPont™ Performance
Chemicals-
July 2015

Industry Leader
with over 85 years of
experience in
refrigeration

Inventors of



...and Low-GWP



Topics



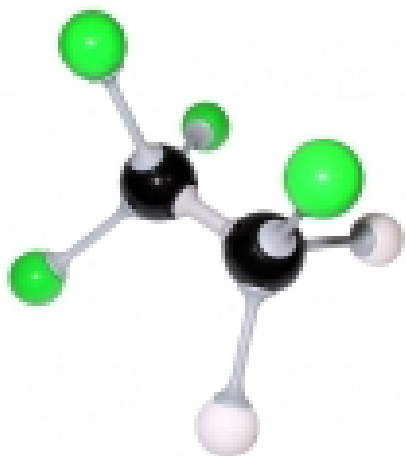
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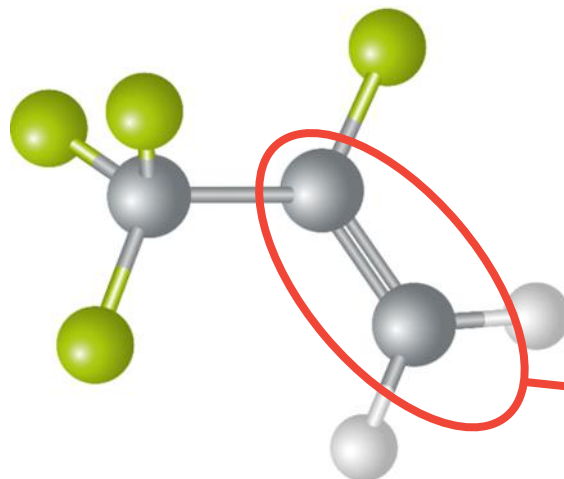
How does HFO technology help achieve climate goals?

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What is an HFO?



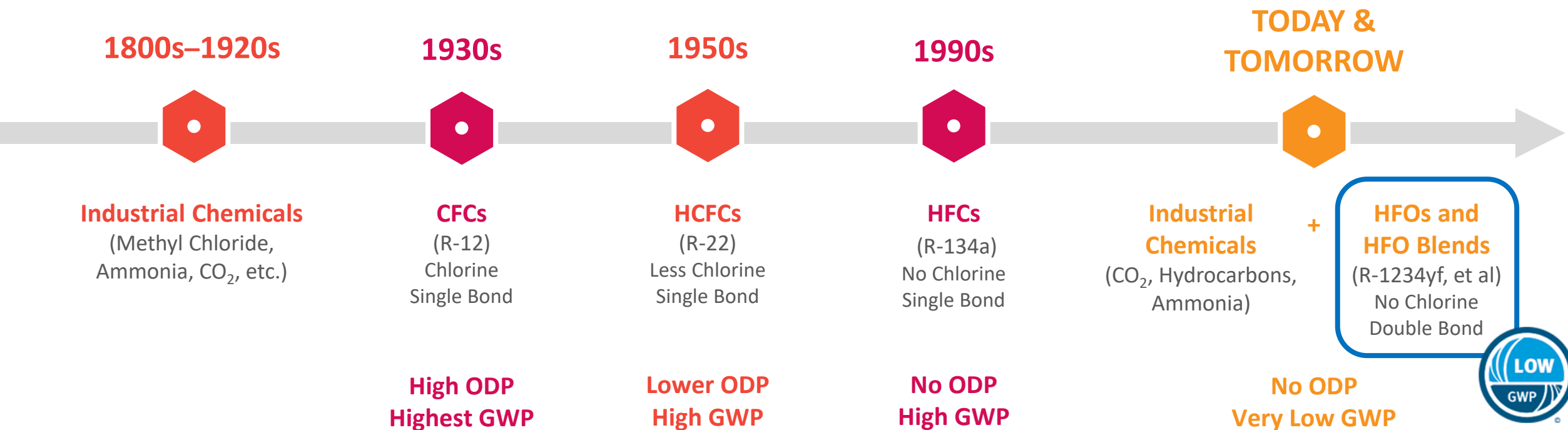
HFC
Hydro fluorocarbon



HFO
Hydro fluoro olefin

*Weaker double bond
in HFOs allows for
short atmospheric life
while maintaining
stability in systems*

Evolution of Refrigerant Technology



Chemours brand of next generation refrigerants is



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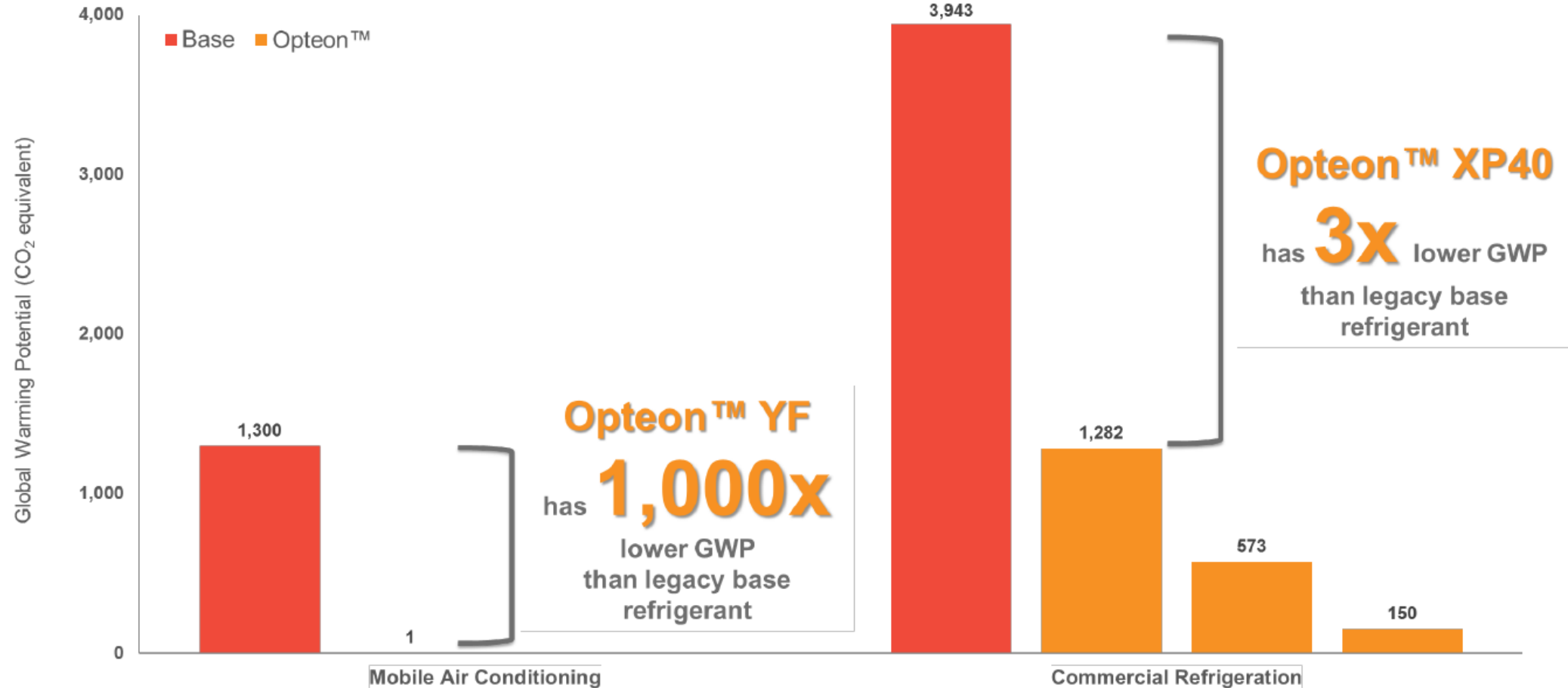
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The HFO Advantage – CO₂ Equivalent Basis



The Optimal Balance of Properties



Full Portfolio of Commercial Solutions



Opteon™ XP Series Refrigerants

- ✓ Low GWP, Non-flammable
- ✓ For both New Equipment & Retrofit of Existing Equipment
- ✓ Excellent capacity and energy match to HFCs



Opteon™ XL Series Refrigerants

- ✓ Very Low GWP (Class 2L Mildly Flammable)
- ✓ Design compatible with new Equipment
- ✓ Higher charge sizes permitted compared with other flammable refrigerants
- ✓ Exceeds anticipated requirements of future regulations

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HFO Adoption in Mobile Air Conditioning

Millions of Cars Using HFO-1234yf Globally*



*Estimated by Chemours

Conversion of 50 million cars to Opteon™ YF represents a reduction in carbon emissions by the equivalent of more than 4 billion gallons (15.1 billion liters) of fuel

Recent Adoption in Stationary Applications

HFO Blend R-454B Chosen in Select Air Conditioning & Heat Pump Equipment

- Selected by Carrier for NA Ducted Residential & Light Commercial Products, announced December 2018
- Selected by Johnson Controls for YORK® YLAA Scroll Chiller in Europe, announced October 2018

Carrier Introduces Puron Advance™: The Next Generation Refrigerant for Ducted Residential, Light Commercial Products in North America

INDIANAPOLIS - Dec. 19, 2018

Carrier, in collaboration with The Chemours Company, will offer Puron Advance (R-454B) to meet UN Montreal Protocol Kigali Amendment regulations

Keeping with its long history of leading environmental responsibility, Carrier is offering the refrigerant of the future. After extensive tests and evaluations, Carrier has selected Puron Advance commercially as Puron Advance™, as its primary lower Global Warming Potential (GWP) refrigerant for all of its ducted residential and light commercial packaged solutions. Puron Advance is offered in these Carrier products beginning in 2023, is expected to surpass R-410A in efficiency and performance. Carrier will select the best-suited refrigerant for other applications in the future. Carrier is a leading global provider of innovative HVAC, refrigeration, fire, security and building solutions for United Technologies Corp. (NYSE: UTX).

Carrier has been working with The Chemours Company, a global leader in fluoropolymer technology, who will produce and distribute the new refrigerant in North America. Puron Advance refrigerant was selected as the best solution to minimize environmental impact, improving performance, safety, and longevity, based on the United Nations Montreal Protocol phase-down plan for HFCs. Carrier has worked closely with regulators and researchers to develop regulations that will help ensure the safe use of R-454B.

"Carrier is committed to the environment by providing efficient, responsible products. Puron Advance refrigerant is the next logical step in the evolution of our ducted Residential HVAC, Carrier. "We carefully studied all alternatives and chose Puron Advance for its environmental impact for this product category. Innovation and technology will continue to lead the way with the evolution of refrigerants of the future."

Data Sheet

YORK® YLAA Scroll Chiller with low-GWP R-454B



Leading the transition to the next generation of low-GWP refrigerants

Johnson Controls continues to take a leadership role in the transition to the next generation of low global warming potential (GWP) refrigerants with the announcement of R-454B available on the YLAA scroll chiller platform from 190 to 520 kW cooling capacity.

The YORK® YLAA air-cooled chiller is an environmental leader delivering outstanding efficiency for all air-conditioning applications. YLAA chillers are self-contained cooling solutions that are light-weight and compact for convenient installation and have a wide range of accessories and options including factory packaged variable speed pumps, Johnson Controls Smart Connected Chillers, intelligent performance monitoring, and low sound packages.

About R-454B refrigerant

R-454B is a low-GWP HFO refrigerant to replace R-410A in positive displacement, direct expansion air-conditioning, heat pump and chiller applications. R-454B is the lowest GWP replacement for R-410A and provides similar properties and operating performance without major modifications to the equipment design. While all commercially viable replacements for R-410A are classified as flammable, R-454B has a lower burn velocity than R-32 and has the mildly flammable and low toxicity ASHRAE classification of A2L.

Why adopt the R-454B?

- Transitioning to low-GWP refrigerants is mandated by F-Gas regulations with the goal of reducing greenhouse gases.
- R-454B has the lowest-GWP and is most aligned with F-Gas goals and refrigerant quota costs.
- F-Gas regulations have caused a significant shift in refrigerant pricing, whether purchased in EU or imported. By moving to low-GWP R-454B, the YORK® YLAA is prepared for the future as F-Gas quotas continue to drive costs up.
- Same capacity and higher efficiency than R-410A.

YLAA product features

- SCROLL COMPRESSORS
- MICROCHANNEL CONDENSER
- EER UP TO 3.2 (EUROVENT CLASS A)
- LOW SOUND OPERATION
- SINGLE POINT ELECTRICAL CONNECTION
- OPTIONAL PUMP PACKAGES
- OPTIONAL HEAT RECOVERY TO 60°C
- AMBIENT OPERATION FROM -18°C TO 35°C
- CHILLED WATER SUPPLY FROM -12°C TO 15°C

	R-454B R-32 & R-125	R-454B R-32 & R-125/41	R-32
Competition	R-410A	R-410A	R-410A
GWP per ton	1980	471	677
Safety Classification	A1	A2L	A2L
Capacity	190	190	190
PL COP	3.2	3.2	3.2
SEER	3.2	3.2	3.2
Burn Velocity (m/s)	—	0.7	0.7

For more information • www.york.com/en/europe

YORK® YLAA SCROLL CHILLER WITH LOW-GWP R-454B



Thank you!

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